

Single Event Effects Test Report for Candidate CINDI Devices Test Trip to TAMU, FEB 2004

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Introduction:

This testing was performed to determine the single event latchup (SEL) sensitivity of candidate devices for the CINDI project. The devices were qualitatively monitored for single event transients (SETs) as well. The devices tested were the IFN423-2 and the OPA128. This testing was performed at the Texas A&M University Cyclotron.

Devices Tested:

The IFN423 is a dual N-channel silicon Junction Field-Effect transistor, manufactured by InterFET Corp. The device markings are: IFN423-2 9638 (top) and the lot date code is 9638.

The OPA128 is an ultra-low bias current Difet® Electrometer-Grade operational amplifier, manufactured by Burr-Brown. There were two different sets of these devices, the device markings are: 17 B-B ZK9V8 and 16 B-B ZH5B8 (top) and OPA128SM (side of can). There was no specific lot date code as associated with these devices other than the "Z" numbers.

Test Facility Information:

The devices were tested at the Texas A&M University Cyclotron Facility (TAMU). The cyclotron was tuned to 15MeV/amu for the beams used in testing. A complete list of beams and relevant information is given below. The LET values may vary slightly due to a difference in distance from the device to the beam window. All devices were mounted in air at the end of the Radiation Effects Facility line off of the K500 cyclotron.

Ion	Angle of Incidence	LET (MeV•cm ² /mg)	Range in Silicon (? m)
Silver	0	44.2	96.8
Xenon	0	53.9	94.2

Test Setups:

Each Heavy Ion Test Setup consisted of a printed circuit board (PCB), power supply, control computer, DMM, and oscilloscope. The PCB held the Device Under Test (DUT) and the other circuitry needed to monitor the devices and receive commands from the control computer via GPIB interface, exercised the DUT, collected data and sent them back to the control computer.

Both the IFN423 and the OPA128 were monitored for SEL and the output was checked for SETs. The output of the devices was monitored by a custom test program written in LABVIEW, all of the equipment and the devices were controlled by this program through a GPIB interface. The test board schematic is given below.



The OPA128 showed no SEL in either of the two versions tested. The total fluence was 1×10^7 ions/cm² at an LET of 53.8 MeV•cm²/mg (Xe). The SEL cross section is therefore $< 1 \times 10^{-7}$ cm² for both the “16” and “17” coded parts. There were a significant number of SETs observed at an LET of 53.8 MeV•cm²/mg (Xe). The cross section appears to be greater than 1×10^{-4} cm²/device.